Name: _____ Packet Due Date: _____

Science

Module 5	**Population Changes and Resources**
Chapter 2	**Community Ecology**



Lessons & Objectives

Lesson 1: Symbiotic relationships

- ❑ **I can…** describe the types of symbiotic relationships between organisms in an ecosystem.

Lesson 2: Predator-Prey relationships

- ❑ **I can…** describe predator-prey interactions within a community.

Lesson 3: Hawaiian Monk Seals connection to their community

- ❑ **I can…** describe the impact of predators and competition on Hawaiian Monk Seal populations.

Packet Completion Rubric

4	3	2	1	0
Nothing in packet is missing. Responses consistently meet ALL of the criteria for high quality work. Exemplary effort is evident throughout entire packet.	Packet is 75-100% complete/accurate. Work/effort misses the criterion for high quality consistently.	Packet is 50-75% complete/accurate. Work/effort has evidence of quality but not consistently.	More than 50% of the packet is incomplete or incorrect. Work does not meet the expected level of quality.	Packet is entirely incomplete or not turned in.

Grading Breakdown: 0 - 1.9 = F 2 - 2.4 = D 2.5 - 2.9 = C 3 - 3.4 = B 3.5 - 4 = A

Lesson 1: Symbiotic Relationships

Objective: I can… describe the types of symbiotic relationships between organisms in an ecosystem.

Lesson 1 Do Now

Organism do more than just eat one another. **OBSERVE the following pictures. DESCRIBE how the organisms are interacting based on your observations!**

 Observations:	 Observations:	 Observations:

Intro. To Community Ecology

Think back to Quarter 2 when we learned the different levels of organization in ecology. Last chapter, we covered ***population ecology*** and how the monk seal population is influenced by limiting factors. This chapter, we are going to delve into ***community ecology*** to better understand how populations are affected by other organisms within an ecosystem. This mainly revolves around the different interspecific (a.k.a. between species) ***relationships***, such as symbiotic and predator-prey relationships!

Intro. To Ecological Relationships Video Notes

As you watch: Try to define SYMBIOSIS and come up with some examples. Write additional notes here as well:

Symbiotic Relationships

Key Terms:

Symbiosis - interaction between 2 species that can benefit _____.

Type	Definition	Example

Symbiotic Relationships – You Try!

	Ostriches and gazelles eat next to each other. They both watch for predators and danger. Since they see things differently, they each can identify threats the other animal may not see.
	A cuckoo bird may lay its eggs in a warbler's nest. The cuckoo's young will kick out the warbler's young and will be raised by the warbler. This is good for the cuckoo but bad for the warbler.
	Mistletoe takes water and nutrients from the spruce tree.
	Yucca flowers are pollinated by yucca moths. The moths lay their eggs in the flowers and the eggs hatch. The larvae eat some of the seeds, and spread them around.
	Barnacles attach themselves to whales so they can get a free meal. This neither harms nor helps the whales.

Hermit Crabs and Sea ANemones

How do hermit crabs benefit?	**How do sea anemones benefit?**

Generalists vs. specialists

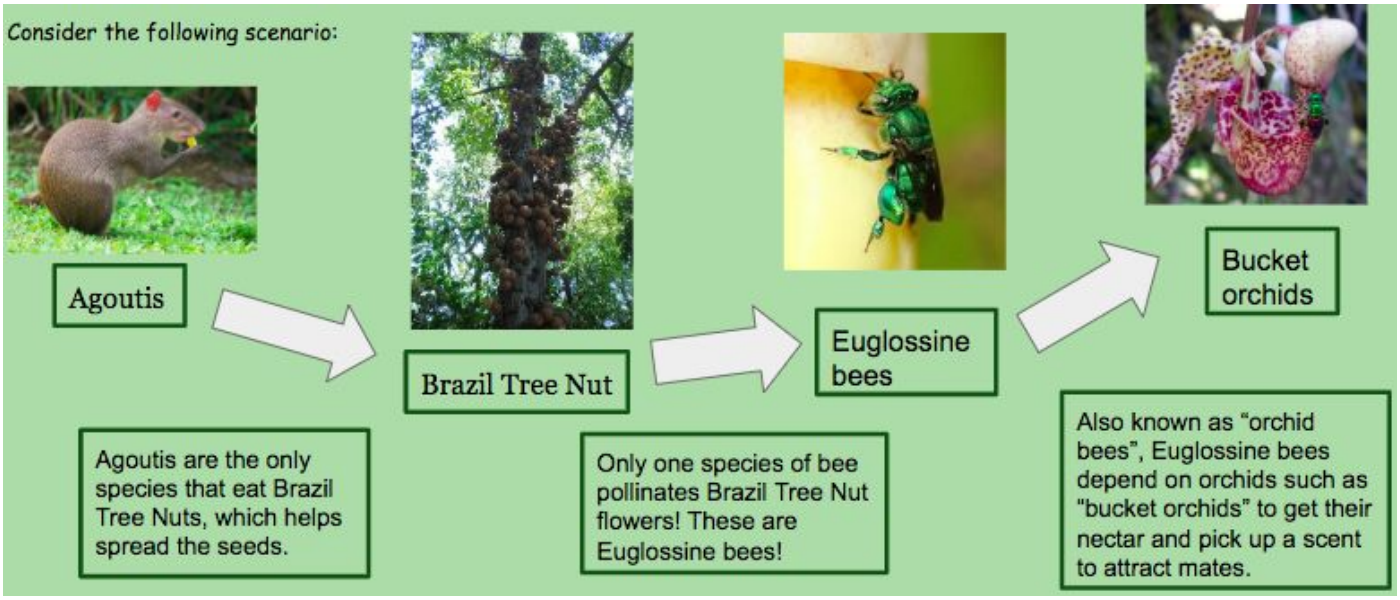
Video Notes:

You can classify species into two major categories:

Generalists - are able to thrive in a _____ of environmental conditions and can make use of a variety of _____ (i.e. raccoon).	**Specialists -** can thrive only in a _____ of environmental conditions or has a _____ (i.e. koala).

Interdependent Relationships

Some species benefit so greatly from each other that they need each other to survive. These are known as interdependent relationships. Specialist species will form interdependent relationships with other species and need those species to survive. It is likely that a specialist species may be endangered as a result of these requirements.



Lesson 1 Exit Slip

To further understand interdependent symbiotic relationships, please read and annotate "The Ant and The Acacia" article. Then, answer the following questions:

1. What do the acacia ants get from the bullhorn acacia tree? _____
2. What do the bullhorn acacia trees get from the acacia ants? _____

The Ant and the Acacia

When we think about species in an ecosystem, we're often thinking in terms of food webs that show what eats what. In a food web, you can see relationships like predation (when one species eats another) and competition (when two species are both trying to get the same resource, such as food). In these relationships, it seems like what is good for one species is bad for the other. If a predator population increases, its prey population is likely to decrease. However, not all relationships in ecosystems are like this: in some cases, two species interact in ways that are good for both species. One example is the bullhorn acacia tree and the acacia ant.

Bullhorn acacia trees and acacia ants have a kind of relationship called mutualism that helps both species survive. All organisms need certain things to stay alive; things like food and a place to live. In some cases, organisms get what they need through mutualistic relationships with other species. Mutualism provides both species with something they need. Ecosystems are full of mutualistic relationships like the one between bullhorn acacia trees and acacia ants.

Bullhorn acacia trees are thorny trees that grow in Central America. With no damage to themselves, these trees provide everything acacia ants need to survive: water, a complete diet, and shelter inside their big, hollow thorns—the ants can chew through a spot at the bottom of a thorn and move right in to raise their young.

At the same time, acacia ants act as bodyguards against other animals that might want to eat bullhorn acacia trees. If another animal tries to eat the tree they call home, the ants attack the animal and their bodies release a bad-smelling chemical. This relationship ensures that the ants have food and a place to live, and the acacia tree is protected from organisms that might destroy it.

Mutualism is helpful to both species—which means both species would be harmed if the population of one species decreased. Say the bullhorn acacia trees were wiped out by a tree disease. In that case, the acacia ants would have to find other sources of food and shelter, and there's no guarantee they'd find either one. The acacia ant population would decrease.

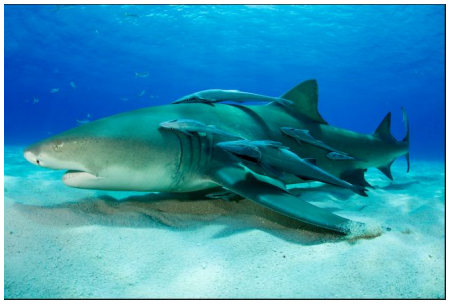
Just as acacia ants would be harmed if bullhorn acacia trees disappeared, the trees would be harmed if the ants disappeared. In that case, the acacias wouldn't be able to rely on the protection the ants provide. Animals might eat most of the leaves of the acacia trees, making it harder for the acacias to make food for themselves through photosynthesis. Without enough food, the acacias would have trouble reproducing and the population of acacia trees would shrink. Acacia ants need bullhorn acacia trees, and bullhorn acacia trees need acacia ants.

Objective: I can describe predator-prey interactions within a community.

Lesson 2 Do Now

For each picture answer the following questions:

1. What kind of symbiosis is taking place here?
2. What is the definition of that type of symbiosis?
3. How does this situation fit that definition?



1. _____

2. _____

_____

3. _____

_____

1. _____

2. _____

_____

3. _____

_____

1. _____

2. _____

_____

3. _____

_____

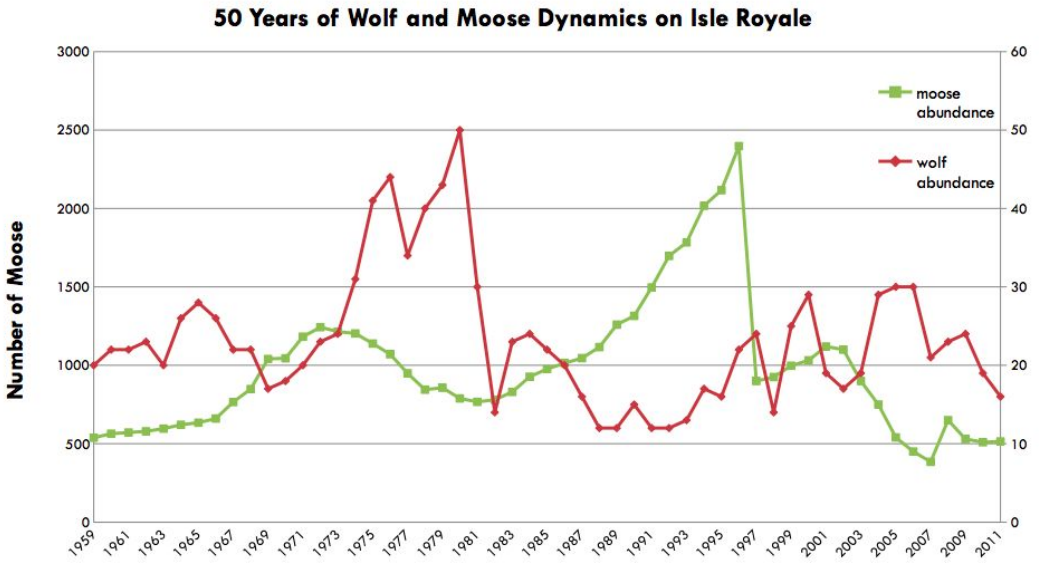
Predator-Prey Introduction

One of the most common interspecific relationships we see in nature is the **predator-prey** relationship. Both populations are limited by and dependent upon each other. As we delve into this today, keep in mind the symbiotic relationships we learned about yesterday and how those relationships affect both predators and prey!

Wolves in Yellowstone

Elk in Yellowstone

Predator-Prey Model Example



Moving Beyond Just Predator and Prey

Another big factor as to the number of predators and prey include the overall life history of different species.

- **Some species have shorter life spans.**

Examples:

- **Some species have longer life spans.**

Examples:

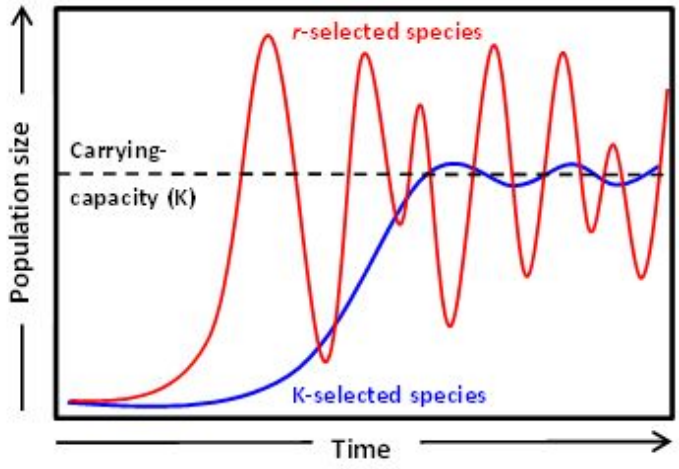
These are known as _____ and _____ species! The dynamics of predator and prey depends upon the type of species!

K-selected vs. R-Selected Species

1. _____
   - short life span
   - low parental investment
   - early maturity & lots of offspring

2. _____
   - long life span
   - high parental investment
   - late maturity & few offspring

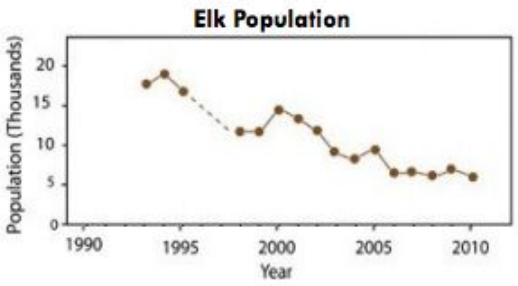
r-selected species experience more fluctuations vs. **K-selected** species have more stability at carrying capacity.

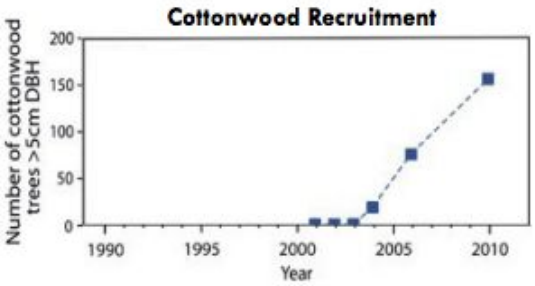


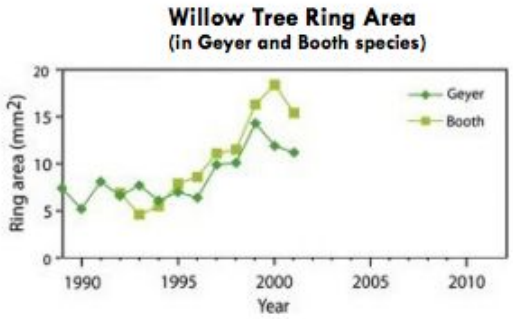
Lesson 2 Exit Slip

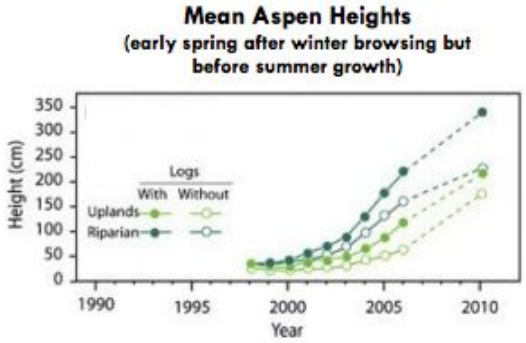
In 1995, wolves were reintroduced to Yellowstone National Park. Record your observations of trends you see in the following graphs.

Note: Cottonwood, Willow Tree and Aspens are all species of tree, where the saplings are eaten by elk found within the park.









_____

_____

_____

_____

_____

_____

_____

_____

_____

Lesson 3: Hawaiian Monk Seals connection to their community

Objective: I can describe the impact of predators and competition on Hawaiian Monk Seal populations.

Lesson 3 Do Now

Take the mini quiz on symbiotic relationships provided by your teacher!

Bringing It Full Circle

The last couple days we've explored ecological relationships within different communities. We are now going to bring it back to where we started in Chapter 1, by focusing on how these ecological relationships affect monk seals. We'll revisit some of our previous data, as well as explore some new evidence to see what the biggest community impacts are on monkseal population recovery.

Chapter 1 Revisit

Let's revisit the table from Chapter 1.

*What do you think are the two biggest **community** factors that would affect monk populations?*

Write down your ideas and then share with an elbow partner!

_____

_____

_____

_____

_____

_____

_____

Threat	Most Vulnerable Age-Class	Frequency of Threat Occurring	Certainty of Impact	Relative Impact to Recovery
Food Limitation	Pups & Juveniles	High	High	Crucial
Entanglement	Pups & Juveniles	High	High	Crucial
Shark Predation	Pups	High	High	Crucial
Infectious Disease	All Age-classes	Low	Low	Serious
Habitat Loss	All Age-classes	High	High	Serious
Fishery Interaction	All Age-classes	Medium	High	Serious
Male Aggression	Immature & Adult Females	Low	High	Serious
Human Interaction	All Age-classes	Medium	High	Serious
Biotoxins	All Age-classes	Low	Low	Moderate
Vessel Groundings	All Age-classes	Low	Low	Moderate
Contaminants	All Age-classes	Low	Low	Moderate

Video Questions: NWHI Community Dynamics

1. What is the main predator of monk seal pups in the NWHI?

2. How do albatross connect to monk seals?

3. How do sharks affect monk seals on the NWHI?

Video Questions: Monk Seal Cam

1. What is the ecological relationship between the monk seal and the octopus/eel/triggerfish?

   _____

2. What is the ecological relationship between the monk seal and the jacks/sharks?

   Adults: _____

   Pups (from previous slides): _____

Key Concept

The size of a population can be affected by any population connected to it, even if no direct predator-prey relationship occurs. This is a _____.

In context:
Sharks may prey upon Hawaiian monk seal pups, particularly in the NWHI; however, will not normally attack adults.
However, sharks and large species of jacks compete with adult Hawaiian monk seals for food resources.

Exit Slip

Taking what you know about community ecology and reviewing the table at the beginning of this lesson, answer the following questions:

1. What do you think are the main threats to monk seals on the main Hawaiian islands?

2. How do you think we could mitigate those threats to monk seal populations?